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VITAMINS

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What are vitamins? No one knows what vitamins *are*, but what vitamins *do* is well known. Animals, including man, cannot live without vitamins. Without vitamins in the diet growth stops; disease and death result. Diets containing vitamins, but in insufficient amounts, produce more or less serious effects depending on the degree of deficiency.

The effect of a ration lacking in vitamin C is shown in the unthrifty condition of the guinea pig to the left. This pig later died. The other guinea pig, fed the same ration with the addition of ½ teaspoon of tomato juice each day, grew sleek and fat.

How do we Know that Vitamins Exist?

When the known constituents of foods are separated, each in pure form, and then these purified compounds mixed in the proportions proper for a good diet, what is known as a "synthetic" food is obtained. These synthetic foods will not support growth nor maintain health in animals. Altho they contain proteins, fats, carbohydrates, and salts in proper amount, and are digestible and palatable, they lack some ingredient essential to natural foods. The addition of certain natural foods or extracts from natural foods to "synthetic" diets has remarkable effects on the growth and health of animals. The natural foods or extracts added are sometimes so small in quantity that they could not add enough proteins, fat, carbohydrates, or salts to be of benefit. It follows, then, that they must contain another type of substance or substances. These substances are called vitamins.

How Many Kinds of Vitamins are Known?

Three types of vitamins are known to exist. It is believed by some that there are other types; but there is doubt whether more than three types exist or whether certain types perform more than one function. The three types that are definitely known to occur are Fat Soluble A vitamin, Water Soluble B vitamin, and Water Soluble C vitamin.

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What is Fat Soluble A Vitamin?

Fat Soluble A vitamin is found in certain fats such as milk fat, egg yolk fat, the tissue and body fats of animals. It also occurs in the green leaves of plants, the germs of seeds, and to some extent in fruits and vegetables such as the tomato, sweet potato, carrot, and squash. When animals are fed rations lacking in fat soluble A vitamin, growth stops; there is a loss of weight; health is impaired; the animals are susceptible to certain infectious diseases, notably an eye infection known as xerophthalmia; and finally, death results unless the diet is corrected.

The amount of vitamin A in the food has been found to have a marked influence upon the capacity for reproduction and successful suckling of the young. There is some evidence that a deficiency of vitamin A may be a factor in such diseases as renal calculus, rickets, pellagra, and tuberculosis.

What is Water Soluble B Vitamin?

Water Soluble B vitamin is found in yeast, in the germs and seed coats of cereals and seeds, in leaves, and to a less extent in milk, fruits, roots, tubers, nuts, eggs, and meat. When the diet is devoid of vitamin B, there is a loss in weight, a failure of appetite, and finally, the disease beri beri—polyneuritis, as it is called in animals—ensues. A partial but not complete deficiency of vitamin B leads to impaired growth, a derangement of the functions of the organs of digestion, and a general undermining of health and efficiency.

What is Water Soluble C Vitamin?

Vitamin C is found in *fresh* fruits, leaves, tubers, and roots, and to a less extent in fresh milk and meat. When the diet of man lacks vitamin C, scurvy soon results. The symptoms are soreness of joints, soreness of the gums, and usually a loss of weight. Without change of diet, the symptoms grow worse and death results.

What Foods Contain Vitamins?

One asterisk (*) indicates that the food contains some vitamin.

Two asterisks (**) indicates that the food is a good source of the vitamin.

Three asterisks (***) indicates that the food is an excellent source of the vitamin.

A dash (—) indicates that the food contains no appreciable amount of vitamin.

A question mark (?) indicates doubt as to presence or relative amount.

	Vitamin A	Vitamin B	Vitamin C
CEREALS AND CEREAL PRODUCTS:			
Bread, white (water)	?	*	—
Bread, white (milk)	*	*	?
Bread, whole wheat (water)	*	**	?
Bread, whole wheat (milk)	**	**	?
White flour	—	*	—
Oats	*	**	—
Rice (polished)	—	—	—
FATS AND OILS:			
Beef fat	*	—	—
Butter	***	—	—
Lard	*?	—	—
Nut margarine	—	—	—
Oleomargarine	*	—	—
Olive oil	—	—	—

	Vitamin A	Vitamin B	Vitamin C
MEAT AND PROTEIN FOODS:			
Meat	— to *	* ?	* ?
Liver	* *	* *	*
Beans, Navy	?	* * *	?
Peas	* *	* *	* ?
Milk	* * *	* *	*
Eggs	* *	*	* ?
Peanuts	*	* *	?
FRUITS:			
Apples	*	*	*
Bananas	* ?	* ?	*
Grape juice	?	*	*
Grape fruit	?	* *	* *
Orange juice	*	* *	* * *
Tomatoes, raw	* *	* * *	* * *
Tomatoes, canned	* *	* * *	* * *
VEGETABLES:			
Cabbage, fresh raw	*	* * *	* * *
Cabbage, cooked	*	* *	* *
Carrots, cooked	* *	*	*
Celery	?	*	?
Cucumber	?	*	?
Dandelion greens	* *	* *	*
Lettuce	* *	* *	* * *
Potatoes, sweet	* *	*	?
Potatoes, white (boiled)	?	* ?	*
Spinach	* * *	* * *	?
Squash	* *	* *	?
Turnips	— ?	* *	?
Yeast	—	* * *	—

How Much Vitamin is Required by a Man Each Day?

This question can be answered only very roughly and in terms of the foods which contain vitamins. On the basis of experiments mostly with white rats, the vitamin requirements can be roughly estimated. If the entire amount of Fat Soluble A vitamin needed for one day by the average man had to be supplied by one article of food the following amounts would have to be consumed daily: 1 ounce of butter, 1 quart of milk, 12 ounces of spinach or lettuce, 2 pounds of cabbage or carrots, 1 pound of sweet potatoes, or 1½ pounds of tomatoes. Such foods as white bread (made with milk), white potatoes, and meat contain some vitamin A; but cannot safely be depended on to furnish the entire requirement of the body.

The necessary amount of Water Soluble B would be furnished by about 5 quarts of milk, or any one of the following: 1.5 pounds of eggs, 1 pound patent flour, 4 ounces whole wheat flour, 4 ounces navy beans, 1 pound spinach, 1.75 pounds carrots, 1.25 pounds tomatoes, or 1.5 ounces compressed yeast. One and one-half pounds of meat per day probably would not supply enough vitamin B to maintain health. White potatoes are not a reliable source. Some of these figures are probably too low. It is doubtful if 1 pound of patent flour contains enough vitamin B to supply the needs of the body for one day. Dr. Gren-

fell finds that in Labrador where the chief food is white bread, beri beri is a common disease.

The necessary amount of vitamin C would be furnished in all ordinary diets containing potatoes, fresh fruits, and vegetables in moderate amounts. A lack of this vitamin is probably rare in ordinary American dietaries. Infants fed exclusively on sterilized, dried, or condensed milk are likely to suffer from scurvy unless a little fruit juice is fed. Formerly, soldiers and sailors suffered greatly from scurvy, but in modern times this disease has been largely eliminated, even in warfare, by the provision of proper antiscorbutic foods.

What is the Effect of Cooking on Vitamins?

Vitamin C is rather easily destroyed by heat except in some of the acid fruits and vegetables. Stewed tomatoes, canned tomatoes, and boiled potatoes retain a considerable part of this vitamin. Vitamins A and B also may be destroyed by heat; but ordinary cooking probably has only a slight destructive effect. Vitamin B is soluble in water and a considerable loss may occur in cooking when the water in which vegetables are boiled is poured off.

Do Children Require more Vitamins than Adults?

A diet low in vitamins produces in the child more immediate effects than in the adult. The reasons for this are:

1. The adult has more or less vitamin stored in the body and this may be drawn on to tide over temporary shortages in the diet.
2. A deficiency of vitamins produces in the child a decreased rate of growth and an underweight child is the result. In adults the result of a deficiency of vitamins is not so apparent. The individual may be below par in many ways; but there is no abnormality that can be readily measured.
3. It is probable that the diet of the child should be richer in vitamins than that of the adult in order to meet the extra needs for growth.

How can Foods be Chosen so that the Diet will Contain Sufficient Vitamins?

The following rules if followed will tend to increase vitamins in the diet:

1. A quart of milk a day for children up to 12 years; a pint a day for all older people should be used.
2. Fresh fruits and vegetables should be used liberally. Fruit should be served twice each day and green vegetables or some vegetable in addition to potatoes should be provided at least twice daily.
3. A large part of the highly milled cereal products, such as white flour, should be replaced by products that more nearly represent the whole grain, such as whole wheat flour and rolled oats.

What About Vitamin Tablets?

Such medicinal preparations may be of great value in cases of illness; but in normal health, they should never be necessary. A properly selected diet can be depended on to provide all the vitamins required for normal development and good health.